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Using SAXS to Study the Storage Potential of Supercritical Carbon Dioxide in Deep Rock Formations and Saline Aquifers

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Capture and sequestration of carbon dioxide gas are important processes for the reduction of carbon dioxide in the Earth's atmosphere. A few potential storage sites within the Earth's crust include deep geological formations consisting of porous rocks such as sandstone or basalt and saline aquifers contained within these formations. We are experimentally investigating the carbon dioxide storage potential of such rocks using time-resolved small-angle x-ray scattering. Our *in situ* experimental approach is to utilize a sample cell that can be pressurized with supercritical carbon dioxide while the rock sample contained within is exposed to an intense x-ray beam every few minutes for a period of 12 to 15 hours. The resulting time-resolved x-ray scattering curves for the rocks at these conditions yield quantitative information on the filling of pores and the evolution of pore sizes. In this way, quantitative analysis of the amount of carbon dioxide in the rock as well as swelling and changes in pore structure as a function of time may be determined *in situ*. Further, the potential retention of carbon dioxide in these samples, following pressurized injection, has been determined. Data for sandstone, shale, and clay rocks will be shown.